Zur Asahina 22.11.06 69460820

21303 JP

AUTOMATIC CHEMICAL ANALYZING APPARATUS

Publication number: JP5099930
Publication date: 1993-04-23
Inventor: MATSUMOTO JUNICHI
Applicant: SHIMADZU CORP
Classification:
- international: ***G01N21/59; G01N21/75; G01N35/00; G01N35/02;*** **G01N21/59; G01N21/75; G01N35/00; G01N35/02;** (IPC1-7): G01N21/59; G01N21/75; G01N35/00; G01N35/02
- european:
Application number: JP19910032396 19910131
Priority number(s): JP19910032396 19910131

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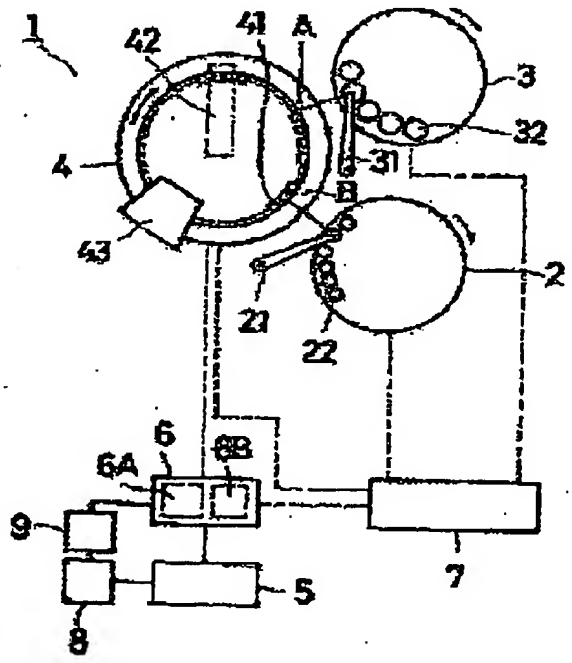
Abstract of **JP5099930**

PURPOSE:To judge a specimen in need of re-examination quickly and to improve analyzing efficiency by providing a reaction-liquid adjusting part, an optical measuring part, a memory part, an operating part and two re-examination controlling parts for controlling the reaction- liquid adjusting part and the optical measuring part. CONSTITUTION:A re-examination controlling part 6 individually compares an absorbance Ai, which is measured at every constant time, with a limit value Ah and sends a control signal into a driver 7 so as to execute the re-examination for a specimen, whose amount is decreased when Ai>Ah. Even in the case of Al<=Ah, the computation of an anticipated value and the comparison of the anticipated value and the limit value Ah at this point are performed based on the data of a memory part 9 and a specified expression of relation. When the anticipated value is higher than Ah, a control part 6A starts the re-examination of the reduced amount by the same way. When the result of the comparison is not applicable to any of the above described cases, the anticipated value of the measured



control part 6B. When the value exceeds a threshold value, the control signal is sent into the driver 7 so as to perform the ordinary re-examination. For the specimen, which does not require the re-examination for the reduced amount, an operating part 5 determines the quantity based on a specified calibration curve.

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Official Gazette of
Unexamined Patent
Publication No. 99930/1993

(19)日本国特許庁（ＪＰ）　(12) **公開特許公報（A）**　(11)特許出願公開番号

特開平5－99930

(43)公開日　平成5年(1993)4月23日

(51)Int.Cl.[5]		識別記号	庁内整理番号	F I	技術表示箇所
G01N	35/00	A	8310－2J		
	21/59	Z	7370－2J		
	21/75	Z	7235－2J		
	35/02	J	8310－2J		

審査請求　有　　請求項の数2（全 8 頁）

(21)出願番号　特願平3－32396

(22)出願日　平成3年(1991)1月31日

(71)出願人　000001993
株式会社島津製作所
京都府京都市中京区西ノ京桑原町1番地

(72)発明者　松　本　周　一
京都市中京区西ノ京桑原町1番地　株式会社島津製作所内

(74)代理人　弁理士　野河　信太郎

(54)【発明の名称】　自動化学分析装置

(57)【要約】

【目的】　光学的な自動化学分析装置における減量及び通常再検が必要な検体についてその判断をより迅速に行なって分析効率の向上を図る。

【構成】　減量再検及び通常再検の要否と、反応が終了する迄の光学濃度変動領域の光学濃度値及び対応する標準試料についての光学濃度値を利用して、リアルタイムに判断しその判断によってこれらの再検操作の指示を反応終了前に制御実行する。

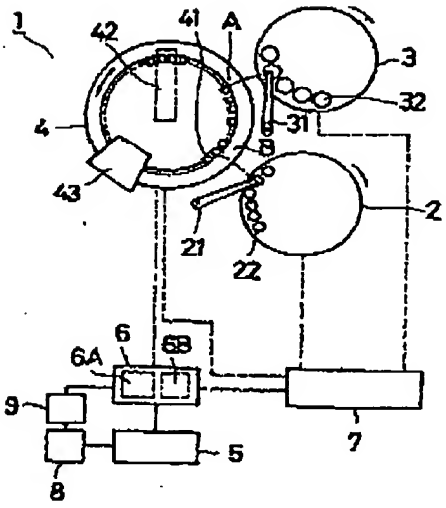
9

２２ 検体容器
３１ 分注器
３２ 試薬容器

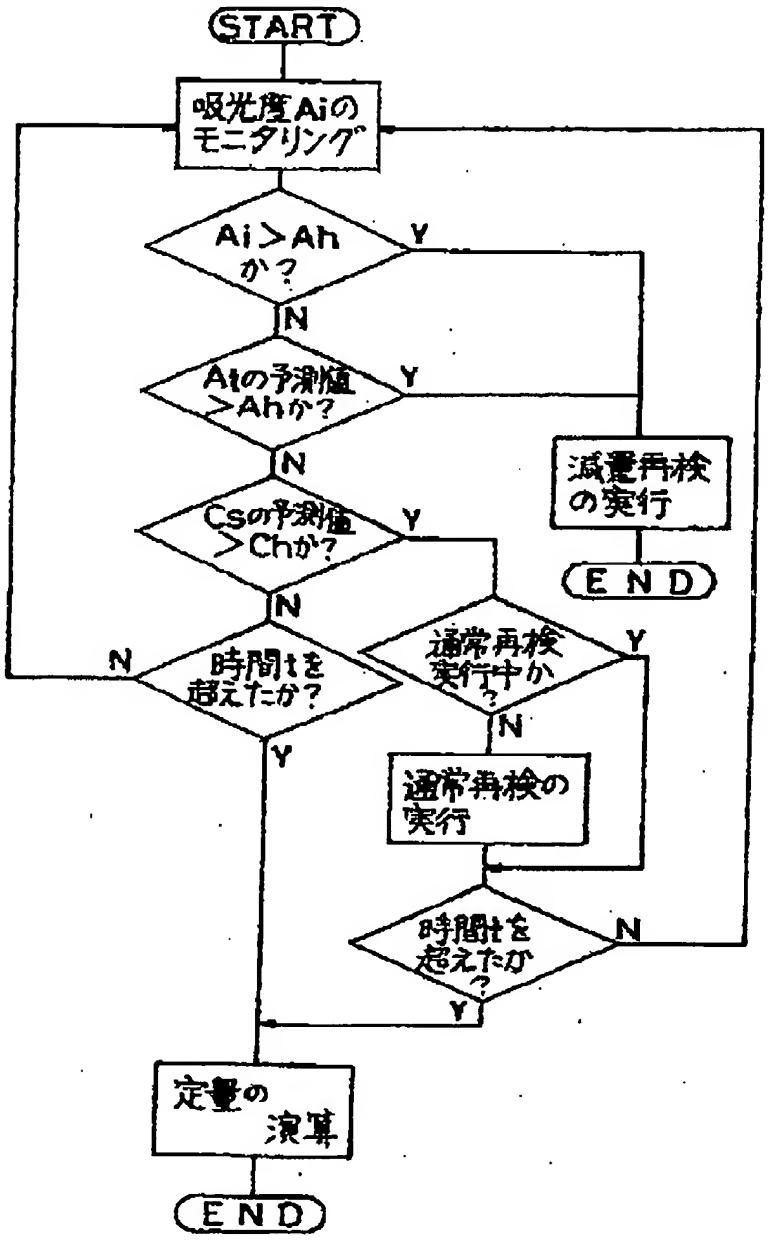
10

＊４１ 反応容器
４２ 吸光度測定光学系
＊ ４３ 洗浄部

【図１】



【図２】



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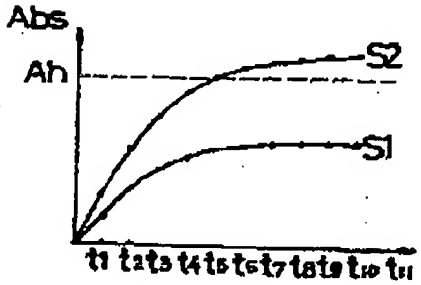

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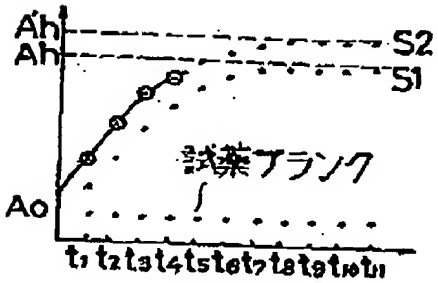
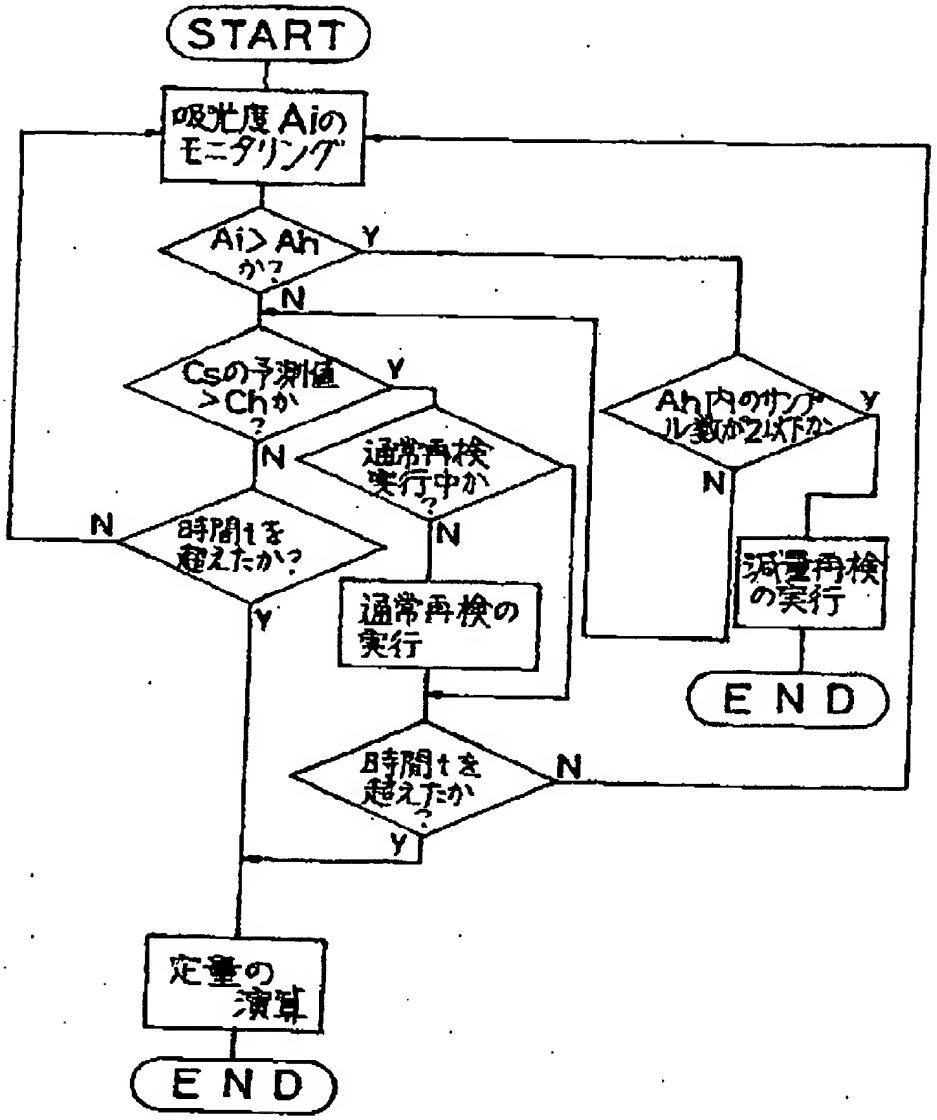
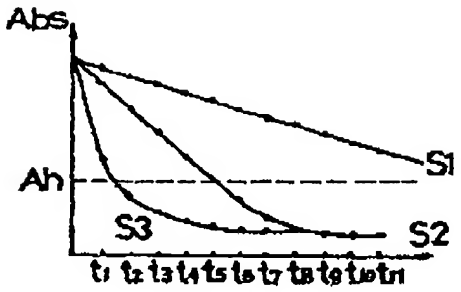


【図3】


START
吸光度Aiのモニタリング
Ai>Ahか?
Y
N
Csの予測値>Chか?
Y
N
通常再検実行中か?
N
8時間tを超えたか?
N
Y
通常再検の実行
Ah内のサンプル数が2以下か
Y
N
減量再検の実行
END
8時間tを超えたか?
N
Y
定量の演算
END

【図5】



Translation in-part of Japanese Unexamined Patent Publication No. 99930/1993 (Reference 3)

Page 4 paragraph number [0025] to Page 5 paragraph number [0035]

[0025]

[Embodiment]

The invention is further explained based on the following drawings. Fig.1 shows an automatic analyzer 1 of the embodiment. The automatic analyzer 1 has a structure which allows multiple analyses in order to select End point method or Rate method. The analyzer 1 basically comprises: an analyte sampling table 2 which distributes analyte from analyte container 22 to reaction container 41 by means of the distribution device 21; a reagent distribution table 3 which distributes a certain reaction reagent from reagent container 32 to reaction container 41 by means of the distribution device 31(before this parenthesis are called reaction mixture preparing parts); optical measuring part 4; calculating part 5; re-examination controlling part 6 (first re-examination controlling part 6A and second re-examination controlling part 6B); and a memory 9. 7 is reaction mixture preparing parts and a driver of the optical measuring part 4. 8 is a display.

[0026]

The above mentioned optical measuring part 4 comprises a table which has many reaction containers 41 and turns them with a fixed cycle, absorptiometer system 42, and washing part 43 which can turn and the optical measuring part 4 has such a structure that it can monitor the absorbance of the mixture (reaction mixture) of analyte distributed at the distribution position B and reaction reagent

distributed at the distribution position A per pre-determined reaction end time t.

[0027]

Memory part 9 stores absorbance of standard mixture of standard sample and reaction reagent per fixed time from the beginning of the reaction to the end of the reaction (time t) and concentration value of a certain material n the standard sample in advance as data. The calculation part 5 and re-examination controlling part 6 are programmed in such a manner that can judge and start each re-examination step based on the measuring mode and quantitative calculation.

[0028]

Firstly, Fig.2 shows a program of first re-examination part 6A which is set when End point mode is selected. As shown in this flow chart, re-examination part first compares each optical concentration Ai (absorbance) measured per fixed time length with the limiting value Ah. When Ai>Ah, re-examination part 6 issues controlling signals to driver 7 so as to conduct re-examination with decreased analyte. Here Ai and Ah each means the absolute value of the difference from the reagent blank. In the reaction mixture preparing part, the amount of the analyte is decreased (in this embodiment, the amount is decreased to half). Reaction mixture is prepared under this condition, and is re-examined at optical measuring part. Even when Ai equal to or less than Ah, the predicted At is calculated based on the relation of data stored in memory 9 and equation (3) and then is compared with Ah. When the predicted value is more than Ah, first re-examination controlling part 6 starts the reduction re-examination in the same

manner as mentioned above. When neither condition is applied, second re-examination controlling part 6B calculates rough predicted measuring value (Cs) based on the equation (4) using absorbance Ai at the time and corresponding absorbance Ai-st stored in the memory 9 and then compares the value with Ch (the upper limit value of the standard range of the subject content) and if the predicted value exceeds Ch, issues the controlling signal to driver 7 to conduct standard re-examination.

[0029]

After the judgment, if At is equal to or less than Ah in the mixture, absorbance is measured and same judgment is done repeatedly in real time until the time t comes. Analyte without need of the reduction re-examination is measured by the calculating part 5 based on the absorbance At ant the moment. In addiction, it is possible to amend the container volume when the re-examination measuring is carried out.

[0030]

Based on the above mentioned re-examination, as shown in Fig.4, in case the absorbance increases during the reaction, with respect to ultra high concentrate analyte whose final absorbance value (at the time t1 1) is more than Ah, it is determined whether to operate reduction re-examination based on absorbance at the time ts or absorbance change until the time t4. If the absorbance of the analyte is less than Ah and concentration of a certain material is Ch, the standard re-examination of the high concentration material is determined to be necessary or not and to be carried out or not. Therefore, early re-examination is carried out before the reaction ends.

And normal analyte S1 is measure in the same manner as prior art.

[0031]

On the other hand, program when the Rate mode is chosen is shown in Fig.3. This frist re-examination controlling part 6 compares each absorbance Ai and limit value Ah in the same manner described above. In the case Ai>Ah, number of samples (actual measure number) in the region of the Ah are counted. If the counted number is equal to or less than two, reduction re-examination is carried out in the same manner as described above. Here, Ai and Ah each is absolute value of the difference from the sample blank. In the case the counted number is equal to or more than 3 and Ai is equal to or more than Ah, predicted concentration rough value (Cs) is calculated in the second re-examination controlling part based on absorbance Ai-st corresponding to absorbance Ai at the moment and equation (4). Cs is compared with the given threshold value Ch and when the Cs is over Ch, controlling signal is issued to the driver 7 so as to conduct standard re-examination.

[0032]

After this judgment, analyte for which reduction re-examination is not operated is judged as same repeatedly until time t, quantitative analysis is carried out based on the analytical curve obtained from the deviation of plural absorbance values in the range of Ah. In addition, it is possible in Rate mode to carry out container volume amendment when the quantitative analysis is conducted for re-examination.

[0033]

Controlling re-examination as mentioned above, high

4	optical measuring part
5	calculating part
6	re-examination controlling part
6A	first re-examination controlling part
6B	second re-examination controlling part
7	driver
8	display part
9	memory part
21	distribution device
22	analyte container
31	distribution device
32	reagent container
41	reaction container
42	absorptiometer optical system
43	washing part

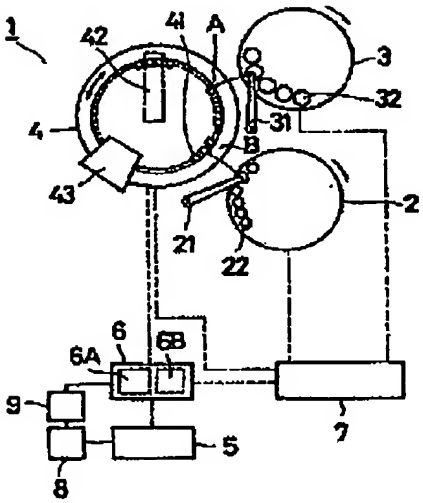
9

２２　検体容器
３１　分注器
３２　試薬容器

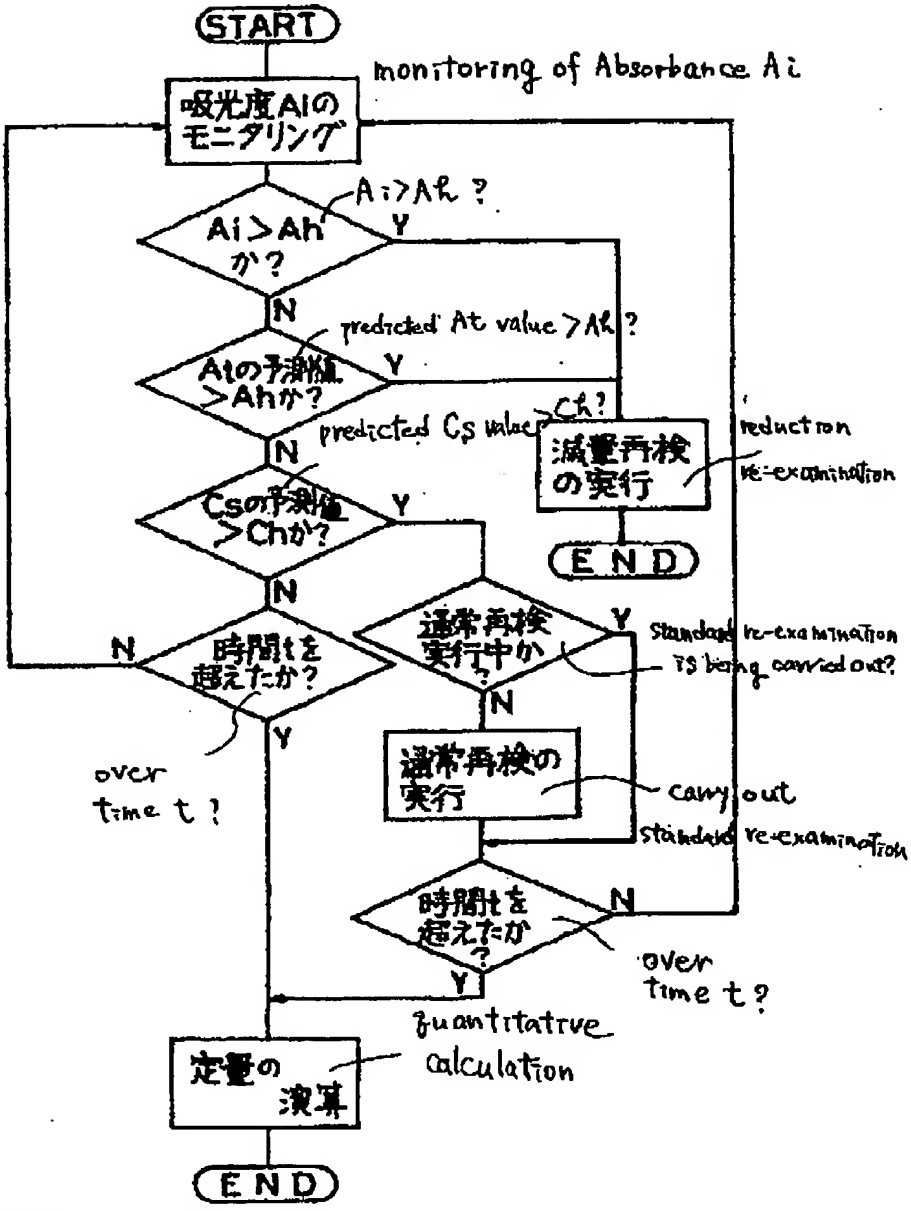
10

＊４１　反応容器
４２　吸光度測定光学系
＊　４３　洗浄部

【図１】



【図２】



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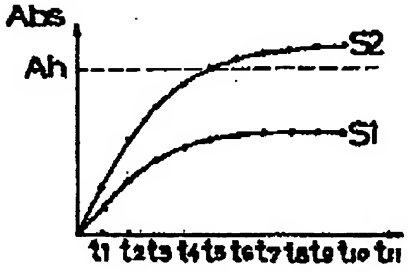

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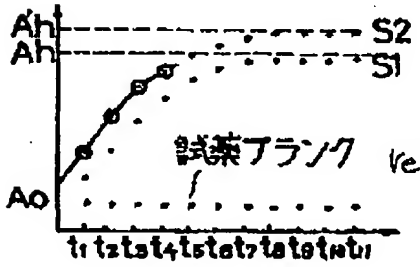
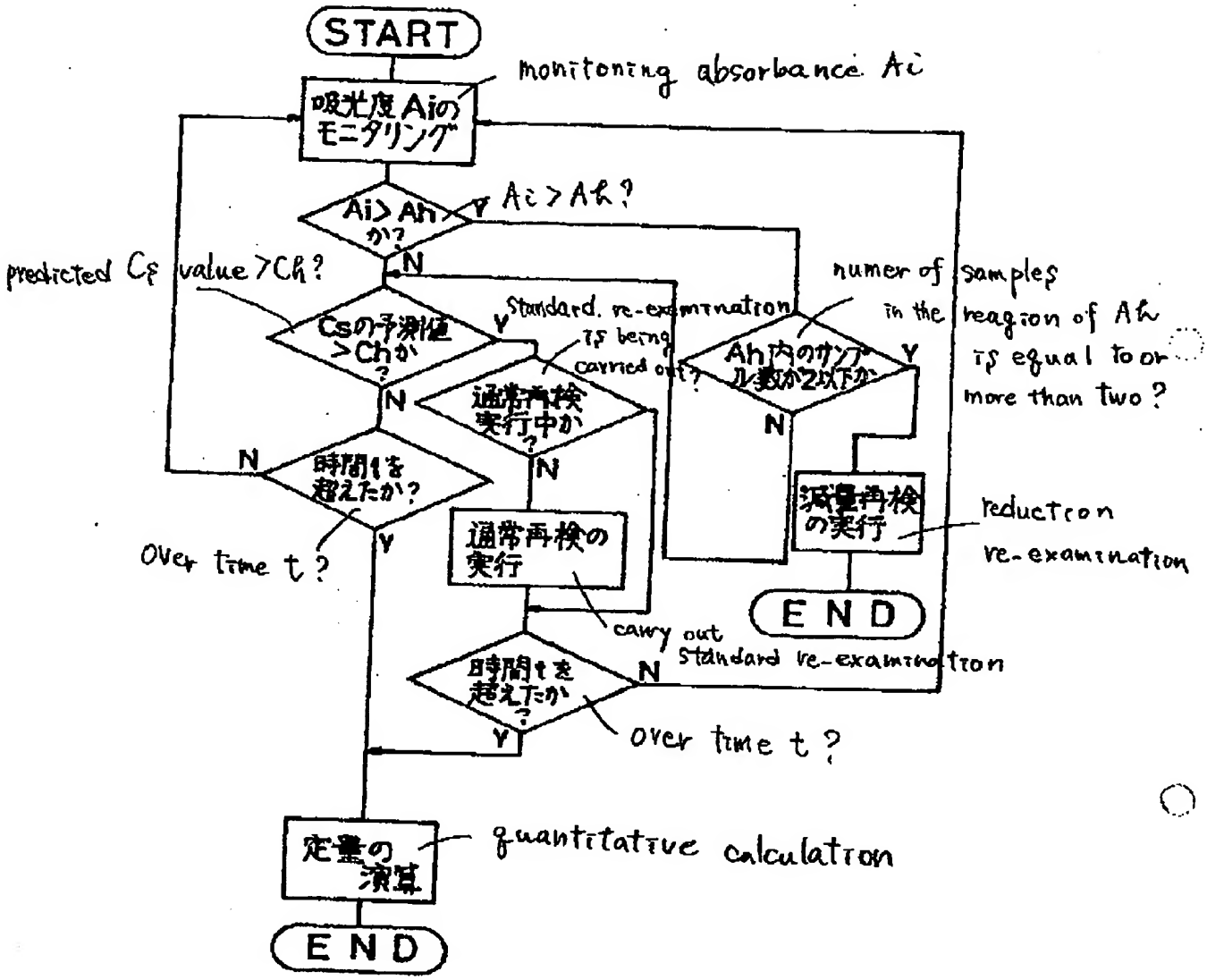


【図3】


START
monitoring absorbance Ai
吸光度Aiのモニタリング
Ai>Ah か?
Y
Ai>Ah?
N
predicted Cs value>Ch?
Csの予測値>Chか?
Y
Standard re-examination is being carried out?
通常再検実行中か?
N
N
時間tを超えたか?
Y
over time t?
通常再検の実行
carry out Standard re-examination
numer of samples in the region of Ah is equal to or more than two?
Ah内のサンプル数が2以下か
Y
N
減量再検の実行
reduction re-examination
END
時間tを超えたか?
N
Y
over time t?
定量の演算
quantitative calculation
END

【図5】